CALS Test Network Test Plans

March 10, 1989

DTIC QUALITY INSPECTED 4

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Prepared for
Air Force Logistics Command
AITI Project

Lawrence Livermore National Laboratory

TEST NUMBER

CTN89-TM-01......Publication Systems Structured Test (PSST)
27 Jan 89   SGML
          TEST COMPLETED AND TEST REPORT BEING PREPARED

CTN89-TM-02......Pratt & Whitney F100-PW-229
6 Feb 89   Engine Technical Order - SGML/IGES/Raster

CTN89-TM-03......Improved Technical Data System (ITDS)
8 Feb 89   Digital Display DTD - SGML

CTN89-TM-04......Vitro Corporation Technical Order
8 Feb 89   SGML/IGES/Raster

CTN89-ED-05......Navy Seawolf (SSN-21) Digital Data Transfer
27 Jan 89   Program - Engineering Drawings - IGES

CTN89-TM-06......McDonnell Aircraft & Xyvision F-15E
27 Jan 89   Technical Order - SGML/IGES/CGM/Raster
          TEST UNDERWAY

CTN89-TM-ED-07...Army CALS - SGML/IGES/Raster
                 Awaiting ACALS Test Proposal

CTN89-TM-ED-08...Army AMRCOM Engineering Drawings
                 and Technical Manuals - SGML/IGES

CTN89-TM-09......Grumman Navy Comparison of Specifications
9 Feb 89   for Digital Delivery of Work Package DTD - SGML

CTN89-TM-10......Pratt & Whitney Technical Order
6 Feb 89   SGML/IGES/Raster

CTN89-TM-ED-11...WR-ALC & Georgia Tech & Lockheed
27 Jan 89   SGML & IGES CALS Research Center
          TEST UNDERWAY

CTN89-ED-12......DOE CALS Sandia National Laboratory
2 Feb 89   Engineering Drawing Interchange - IGES

CTN89-ED-13......Navy EDMICS Engineering Drawings
                 IGES/Raster

CTN89-PD-14......National Institute of Standards & Technology
                 PDES Test Platform

CTN89-ED-15......General Electric Engine Engineering Drawings
6 Feb 89   Optical Disk Interchange to OC-ALC EDCARS

CTN89-ED-16......IBM IGES Engineering Drawings
27 Jan 89   IGES

CTN89-TM-17......Air Force AFTOMS DTD Development
8 Feb 89   SGML

CTN89-ED-18......Navy Sea Combat System Engineering Station
22 Feb 89   IGES

TEST NUMBER

CTN89-ED-19......Douglas Aircraft
23 Feb 89   IGES Drawing Interchange
          TEST UNDERWAY

CTN89-ED-20......Air Force EDCARS Engineering Drawings
                 Awaiting EDCARS MIL-STD-1840A Capability

CTN89-TM-ED-21...Texas Instruments
6 Mar 89

CTN89-ED-22......OO-ALC Cad Drawing Exchange
8 Mar 89

CTN89-XX.........General Dynamics Ft. Worth
                 SGML/IGES/Raster

CTN89-PD-XX......South Carolina Research Authority
                 PDES Test Platform

CTN89-XX.........Honeywell SGML/IGES

CTN89-XX.........Xerox AF 50S SGML

CTN89-XX.........Government Printing Office Contractor(s) Testing

When no CTN Test Plan Number is listed that indicates that it
has not been determined when that test will be performed
or if it will be initiated.

A "date" under the test plan number indicates that the test plan
has been written and that the date is the latest official
version.

CTN TEST PLAN NUMBER CTN89-TM-01

PUBLICATION SYSTEMS STRUCTURED TEST (PSST)

27 January 1989

1. INTRODUCTION AND BACKGROUND

The Computer-Aided Acquisition and Logistics System (CALS) Test Network (CTN) is testing the the effectiveness of the CALS applications of data interchange standards. MIL-STD-1840A specifies that MIL-M-28001 will be used to tag technical data text in-accordance-with Standard Generalized Markup Language (SGML). This is the test plan for the testing of of the conforming Document Type Definition (DTD) contained in MIL-M-28001.

2. OBJECTIVE

The overall test objective is to evaluate the effectiveness of CALS standards for technical data interchange and to demonstrate the technical capabilities and operational suitability of those standards.

2.1 Phase I Objective:

Using a small sample of military technical manual pages, determine the accuracy, completeness, and ease of understanding, and disclose any ambiguities of the DTD for MIL-M-38784 conforming technical manuals in Appendix A of MIL-M-28001.

2.2 Phase II Objective:

After analyzing the results of Phase I, the testing will be expanded to other DTDs contained in MIL-M-28001, utilizing larger size samples, including complete technical manuals. Emphasis will be placed on specific areas of concern such as the treatment of tabular data. A CTN baseline standard reference technical manual document will be utilized in this Phase.

3. PARTICIPANTS

a. Compugraphic Corp,
   Shalom Rich, 508/658-0200 x7261
   Wilmington, MA.

b. Context Corp,
   Phillip Kilcoin, 503/646-2600
   Beaverton, OR.

c. Datalogics Inc,
   Pam Gennusa, 312/266-4399
   Chicago, IL.

d. Exoterica Corp,
   John McFadden, 613/722-1700
   Ottawa, Canada.

e. IBM,
   Sharon Adler, 303/924-9845
   Boulder, CO.

f. Interleaf Corp,
   Paula Angerstein, 617/577-9800
   Cambridge, MA.

g. Scribe Systems,
   Mary Laplante, 412/281-5959
   Pittsburg, PA.

h. Softquad Inc,
   Yuri Rubinski, 416/963-8337
   Toronto, Canada.

i. Xyvision,
   Moira Meehan, 617/245-4100
   Wakefield, MA.

j. CALS CTN:

   Lawrence Livermore National Laboratory,
   Mr. Peter Prassinos, AITI/CTN Project Manager
   415/422-4758
   Livermore, CA.

   HQ Air Force Logistics Command
   HQ AFLC LMSC/SJTC,
   Ms. Jo Smith, Chief, AFLC CALS Division
   513/257-3085
   WPAFB, OH.

   Syscon Corporation,
   Mr. Al Howe, 619/296-0085
   San Diego, CA.

4. STANDARDS AND SPECIFICATIONS

The test files used in Phase I of this test will contain text tagged iaw with MIL-M-28001.

The test files used in Phase II of this test will contain text tagged iaw with MIL-M-28001 and may contain illustrations iaw MIL-D-28000 IGES, and/or MIL-R-28002 Raster, and/or MIL-D-28003 CGM.

5. PROCEDURES

Phase I: Five or six pages of technical manuals will be tagged in accordance (iaw) with the MIL-M-38784 conforming DTD contained in Appendix A of MIL-M-28001. These pages will be assembled on a 9-track tape iaw MIL-STD-1840A; this tape will be parsed and checked for completeness on the Syscon ATOS, San Diego, CA, and then copies will be furnished to the participants identified in Paragraph 3, above.

No hard copies of the technical manual pages nor any processing instructions will be forwarded with the test files to the receiving systems. The receiving systems will process the file and send back to Syscon hard copies of their interpretation of the pages.

The receiving system outputs will be compared by the CTN for visual equivalency to determine if the DTD has been interpreted correctly and if the intent of the tagging scheme was evident to, and correctly ascertained by, each receiving system.

6. CRITERIA

6.1 The participants will utilize their available hardware and software to produce their output documents in Phase I. Phase II system specifications will be identified and documented in a revision to this test plan.

6.2 CTN Technical Publications Test Platform

LOCATION: SYSCON Corporation, San Diego, CA
CONTACT: Al Howe
TELEPHONE: (619) 296-0085
ELECTRONIC MAIL: howe@ati.tis.llnl.gov

a. Hardware: 1. VAX 11/785, running VMS 4.7 with 8 Mbyte memory,
1.2 Gbytes magnetic storage,
268 Gbytes optical storage,
120 ips magnetic tape (1600, 6250 bpi),
line printer and laser printer;
ethernet, GPIB and RS-232 interfaces.

2. Apollo DN 4000 hosting Auto-trol S-5000 CAD system

3. Apollo DN 460 hosting ANAtech software and VANA raster to vector converter fed by Autokon 8200 scanner.

Apollo systems run Aegis version 9.

4. GPIB interconnect from VAX to Apollo DN 4000

5. Domain network to Apollo DN 460

b. Software: 1. Numerous CTN related test tools available on appropriate platforms.

7. DELIVERABLES

Hard copy output documents will be delivered by the participants to Syscon for Phase I evaluation. Phase II deliverables will be identified in subsequent revisions to this test plan.

8. SCHEDULE

    a. Phase I test file tapes sent by Syscon to the participants:
       November 1988.

    b. Participants process tapes and return hard copies to Syscon:
       January 1989.

    c. Phase I results evaluated and presented at the
       TechDoc Winter Workshop, New Orleans, LA:
       27 February 1989.

CTN TEST PLAN NUMBER CTN89-TM-02

PRATT & WHITNEY F100-PW-229 ENGINE TECHNICAL ORDER

6 February 1989

1. INTRODUCTION AND BACKGROUND

By agreement with the Aeronautical Systems Division (ASD), Deputy for Propulsion, Tactical Engines Program Office, the Pratt & Whitney (P & W) Engine Group will furnish an F100 PW -229 Engine maintenance manual in Computer-Aided Acquisition and Logistics (CALS) MIL-STD-1840A format to the CALS Test Network (CTN) and to the Air Force San Antonio Air Logistics Center (SA-ALC) Automated Technical Order System (ATOS).

2. OBJECTIVE

The test objective is to evaluate the effectiveness of CALS standards for technical data interchange and to demonstrate the technical capabilities and operational suitability of those standards.

3. PARTICIPANTS

   a. Pratt & Whitney Engine Group,
      Mr. Don Koski, 407/796-2208.
      West Palm Beach, FL.

   b. AFPRO Det 4 Pratt & Whitney,
      Mr. Carl Giudici, 407/796-5589
      West Palm Beach, FL.

   c. ASD Deputy for Propulsion, Tactical Engines Program Office,
      LT/COL Terry Derrington, Sgt Mark Rice, 513/255-3798,
      ASD/YZFL, Wright-Patterson Air Force Base (WPAFB), OH.

   d. CALS CTN:

      Lawrence Livermore National Laboratory,
      Mr. Peter Prassino, AITI/CTN Project Manager
      415/422-4758
      Livermore, CA.

      HQ Air Force Logistics Command
      HQ AFLC LMSC/SJTC,
      Ms. Jo Smith, Chief, AFLC CALS Division
      513/257-3085
      WPAFB, OH.

      Syscon Corp,
      Mr. Al Howe, 619/296-0085.
      San Diego, CA.

e. San Antonio Air Logistics Center,
   Ms. Vangia Buenrosto, Mr. Ernie Dejesus, 512/925-6107
   SA-ALC/MME, Kelly AFB, TX.

4. STANDARDS AND SPECIFICATIONS

The test files used in this test will contain text and graphics in-accordance-with (iaw) the following CALS standards and specifications:

  a- MIL-STD-1840A AITI

  b- MIL-D-28000 IGES

  c- MIL-M-28001 SGML

5. PROCEDURES

P & W will select, with ASD/YZFL approval, an F100-PW-229 engine technical order to be used in this test. P & W will prepare a test tape iaw MIL-STD-1840A containing the technical order with SGML-coded text and IGES illustrations. The tapes will be deliver for testing to the Syscon CTN Test Platform and to the SA-ALC ATOS.

6. CRITERIA

  a. P & W System Specifications:

     Text/SGML - Wang VS 300, O/S 7. 1400
                 Manually tagged SGML data
     Graphics - Apollo platform running Autotrol,
                 using IGES Version 2.0
                 (or subsequent Versions)

  b. CTN Technical Publications Test Platform
     LOCATION: SYSCON Corporation, San Diego, CA
     CONTACT: Al Howe
     TELEPHONE: (619) 296-0085
     ELECTRONIC MAIL: howe@ati.tis.llnl.gov
     Hardware: 1. VAX 11/785, running VMS 4.7 with 8 Mbyte memory,
                    1.2 Gbytes magnetic storage,
                    268 Gbytes optical storage,
                    120 ips magnetic tape (1600, 6250 bpi),
                    line printer and laser printer;
                    ethernet, GPIB and RS-232 interfaces.
                2. Apollo DN 4000 hosting Auto-trol S-5000 CAD system
                3. Apollo DN 460 hosting ANAtech software and VANA
                    raster to vector converter fed by Autokon 8200 scanner
                    Apollo systems run Aegis version 9.
                4. GPIB interconnect from VAX to Apollo DN 4000
                5. Domain network to Apollo DN 460
     Software: 1. Numerous CTN related test tools available on
                    appropriate platforms.

  c. SA-ALC ATOS

7. DELIVERABLES

A "Quick Look" test report will be delivered within 30 days after completion of the test. This report will be prepared by the CTN.

A full test report will be delivered within 60 days after completion of the test. This report will be prepared by the CTN, reviewed and approved by all participants, and delivered for publication and distribution.

8. SCHEDULE

a. P & W Delivers Test File.........4 months after P & W
                                          receives order.

b. Syscon Completes Test............1 month after receipt
                                          of test tape from P & W.

c. Quick Look Test Report...........1 month after test completion.

d. Full Test Report.................2 months after test completion.

e. SA-ALC Conducts Test.............No earlier than 4 months
                                          after P & W receives order and
                                          when SA-ALC ATOS is capable to
                                          receive MIL-STD-1840A data.

f. Quick Look Test Report...........1 month after test completion.

g. Full Test Report.................2 months after test completion.

CTN DRAFT TEST PLAN NUMBER CTN89-TM-03

IMPROVED TECHNICAL DATA SYSTEM (ITDS)
ON-SCREEN DTD

8 February 1989

1. INTRODUCTION AND BACKGROUND

The Air Force Improved Technical Data System (ITDS) program is developing, testing, and demonstrating a generic, improved technical data system which will provide the Air Force the capability to receive, distribute, and present technical order data in electronic form. This system will be compatible with the standards of the Department of Defense Computer-Aided Acquisition and Logistics System (CALS) program.

2. OBJECTIVE

The test objective is to determine the ITDS's ability to accept MIL-STD-1840A digital technical information and to test MIL-M-28001 and it's supplements that provide for the text mark-up coding for electronic display of technical data.

3. PARTICIPANTS

 a. HQ ASD/AL-1,
    Major Dave Schmitz, 513/255-9428
    ITDS Program Manager
    WPAFB, OH.

 b. Northrop Corporation,
    Mr. Steve Weber, 213/942-6553
    Pico Rivera, CA.

 c. CALS CTN:

    Lawrence Livermore National Laboratory,
    Mr. Peter Prassinos, AITI/CTN Project Manager
    415/422-4758
    Livermore, CA.

    HQ Air Force Logistics Command
    HQ AFLC LMSC/SJTC,
    Ms. Jo Smith, Chief, AFLC CALS Division
    513/257-3085
    WPAFB, OH.

4. STANDARDS AND SPECIFICATIONS

The test files used in this test will contain text and graphics in-accordance-with (iaw) the following CALS standards and specifications:

   a. MIL-STD-1840A AITI

   b. MIL-M-28001 SGML

   c. MIL-D-28003 CGM

5. PROCEDURES

5.1. Phase I:

A vendor (or vendors) will be selected to code technical manual text in-accordance-with the electronic display supplements to MIL-M-28001. This text will be submitted on the appropriate media to Northrop for testing on the ITDS system. The purpose of this phase is to test the validity of the electronic display mark-up codes and to determine if the Document Type Definition (DTD) supplement(s) to MIL-M-28001 can be interpreted correctly and if the intent of the tagging scheme is evident to, and correctly ascertained by, the vendor(s) originating system(s).

5.2. Phase II:

A complete technical manual, vendor coded as per MIL-M-28001, will be submitted on the media specified in MIL-STD-1840A to Northrop for testing on the ITDS system. This complete manual will include text and CGM graphics. The purpose of this phase is to test the ability of ITDS to receive MIL-STD-1840A digital technical data. Additionally, this phase will test CGM as it applies to CALS.

6. CRITERIA

   TBS

7. DELIVERABLES

A "Quick Look" test report will be delivered within 30 days after completion of each phase of the test and a full test report will be prepared by the CTN within 60 days after completion of each phase of the test. This report will be reviewed and approved by the participants and delivered for publication and distribution.

8. SCHEDULE

The schedule will be determined by the preparation and acceptance of an electronic display DTD supplement to MIL-M-28001 and the establishment of the receiving system capability to receive MIL-STD-1840A data.

CTN DRAFT TEST PLAN NUMBER CTN89-TM-04

VITRO CORPORATION TECHNICAL MANUAL

8 February 1989

1. INTRODUCTION AND BACKGROUND

The Vitro Corporation will furnish technical manuals in CALS MIL-STD-1840A format to the CALS Test Network (CTN).

2. OBJECTIVE

The test objective is to evaluate the effectiveness of CALS standards for technical data interchange and to demonstrate the technical capabilities and operational suitability of those standards.

3. PARTICIPANTS

a. Vitro Corporation,
   Mr. George Jenkins, 301/231-3401
   Silver Spring, MD.

b. CALS CTN:

   Lawrence Livermore National Laboratory,
   Mr. Peter Prassinos, AITI/CTN Project Manager
   415/422-4758
   Livermore, CA.

   HQ Air Force Logistics Command
   HQ AFLC LMSC/SJTC,
   Ms. Jo Smith, Chief, AFLC CALS Division
   513/257-3085
   WPAFB, OH.

4. STANDARDS AND SPECIFICATIONS

The test files used in this test will contain text and graphics in-accordance-with (iaw) the following CALS standards and specifications.

a. MIL-STD-1840A AITI

b. MIL-D-28000 IGES

c. MIL-M-28001 SGML

d. MIL-D-28002 Raster

e. MIL-D-28003 CGM

5. PROCEDURES

The Vitro Corporation will prepare in MIL-STD-1840A format test tapes containing a DOD format technical manual(s). These test tapes will contain the technical manual composed in the following formats of text and graphics:

a. Text tagged in SGML - Illustrations in IGES.

b. Text tagged in SGML - Illustrations in CGM.

In addition, Vitro will submit test tapes with engineering drawings and text illustrations iaw MIL-D-28002 Raster.

Vitro will also receive MIL-STD-1840A test tapes from the CTN and/or other industry sources for testing on their system.

6. CRITERIA

a. Vitro Corporation Systems Specifications:

Hardware:
1. Sun 280 Server running Sun OS 4.0 with 16 Mbytes memory, 975 Mbyte storage, 120 IPS 1600/6250 bpi magnetic tape, line printer, laser printer, RS232 interfaces to VT100 compatible terminals, 2400 baud modem.

2. Sun 386i/150 work stations running Sun OS 4.0 and DOS 3.5, hosting a Shaffstall media converter.

3. Sun 386i/150 workstation running Sun OS 4.0 and Dos 3.5, Kurzwell OCR page scanner.

4. Sun 386i/250 workstation running Sun OS 4.0 and DOS 3.5, GTY large document/aperture card scanning system.

5. Sun 386i/250 running Sun OS 4.0 and DOS 3.5, Verstec 8836 laser plotter.

6. All host workstations and servers connected with Ethernet and Sun NFS.

Software: Numerous data base, text conversion, composition, graphics data conversion and editing capabilities are available on appropriate platforms.

b. CTN Technical Publications Test Platform

   LOCATION: SYSCON Corporation, San Diego CA
   CONTACT: Al Howe
   TELEPHONE: (619) 296-0085
   ELECTRONIC MAIL: howe@ati.tis.llnl.gov

   Hardware: 1. VAX 11/785, running VMS 4.7 with 8 Mbyte memory,
                  1.2 Gbytes magnetic storage,
                  268 Gbytes optical storage,
                  120 ips magnetic tape (1600, 6250 bpi),
                  line printer and laser printer;
                  ethernet, GPIB and RS-232 interfaces.

              2. Apollo DN 4000 hosting Auto-trol S-5000 CAD system

              3. Apollo DN 460 hosting ANAtech software and VANA
                  raster to vector converter fed by Autokon 8200 scanner.

                  Apollo systems run Aegis version 9.

              4. GPIB interconnect from VAX to Apollo DN 4000

              5. Domain network to Apollo DN 460

   Software: Numerous CTN related test tools available on
              appropriate platforms.

7. DELIVERABLES

A "Quick Look" test report will be delivered within 30 days after completion of each separately-identified test.

A full test report will be delivered within 60 days after completion the test. This report will be prepared by the CTN and approved by the participants, and delivered for publication and distribution.

8. SCHEDULE

 a. The SGML text and IGES graphics test tapes will be
    ready for delivery by Vitro in April 1989.

 b. The remaining schedule(s) will be determined later.

CTN DRAFT TEST PLAN NUMBER CTN89-ED-05

NAVY SEAWOLF (SSN-21) DIGITAL DATA TRANSFER PROGRAM

27 January 1989

1. INTRODUCTION AND BACKGROUND

1.1 The Computer Aided Engineering Systems Assessment Research (CAESAR) project has been initiated at the David Taylor Research Center (DTRC), Code 185, to provide technical support in the integration of the CAD systems and to provide continued technology assessment of CAD/CAM technology in preparation for future CAD/CAM implementations. The Manufacturing Systems Division (Code 185) of the David Taylor Research Center (DTRC) will become a NAVY node in the CALS Test Network (CTN). The CAESAR facility will provide the CTN with hardware and software which is used in the production environment at NAVY and commercial shipyards.

1.2 The proliferation of new CAD/CAE/CAM/CIM (C4) systems and new technologies create a critical need for the interface standards covering communications, hardware, software, and most importantly data transfer to be understood and implemented properly. The biggest technical problem is the transfer of data between the various modules used for design, analysis, manufacture, and management. It is in this area the NAVY needs to develop expertise in order to ensure data can be transferred with confidence, in a timely fashion. This NAVY node of the CTN is being established for the development and evaluation of these standards, as well as for determining how well the vendors are adhering to industrial and military standards.

2. OBJECTIVE

2.1 DTRC will establish the NAVY node of the CTN in order to represent the interests of the marine industry in the implementation of standards required by the CALS program. DTRC participation shall concentrate initially in three areas:

  a. Establish the NAVY node of the CTN.

  b. Document the procedures and 'lessons learned' by the
     SEAWOLF digital data transfer program.

  c. Develop marine industry data transfer test cases.

2.2 Basic entity and application tests will be created, and a methodology for transferring product model information for structural, piping, and Heating, Ventilation, and Air Conditioning (HVAC) will be described with input from Newport News Shipbuilding (NNS), Electric Boat Division of General Dynamics (EB), and NAVSEA. In addition naturally occurring test cases will be developed to test data transfer in the major application areas.

2.3 As the program matures other data transfer issues will need to be investigated such as raster data for drawings and related documentation, development of new application subsets, PDES, and an interface with EDMICS.

3. PARTICIPANTS

   a. Navy David Taylor Research Center,
      Robert Schaffran, 202/227-1368,
      Ben Kassel, 202/227-1355
      Bethesda, MD

   b. General Dynamics Electric Boat Division,
      Greg Morea, 203/446-7608
      Groton, CT.

   c. Newport News Shipbuilding,
      Dan Wooley, 804/380-7901
      Newport News, VA.

   d. Naval Sea Systems Command,
      Cmdr Blaine Brucker, 202/692-1888
      Washington, DC.

   e. CALS CTN

      Lawrence Livermore National Laboratory,
      Mr. Peter Prassino, AITI/CTN Project Manager
      415/422-4758
      Livermore, CA.

      HQ Air Force Logistics Command
      HQ AFLC LMSC/SJTC,
      Ms. Jo Smith, Chief, AFLC CALS Division
      513/257-3085
      WPAFB, OH.

4. STANDARDS AND SPECIFICATIONS

   a. MIL-STD-1840A AITI

   b. MIL-D-28000 IGES

   c. MIL-R-28002 Raster

5. PROCEDURES

5.1 ESTABLISH THE NAVY NODE OF THE CALS TEST NETWORK

Coordinate Navy data transfer activities with DoD. Become an active arm of the CTN to ensure NAVY projects are compatible with on-going CALS programs and act as a focal point to ensure NAVY efforts are represented in the creation and implementation of these standards.

a. Participate in the development and implementation of IGES
    testing in accordance with approved CALS standards
    as coordinated by the CTN. The areas of interest are:

    1) Application subsets.

    2) 3-D models.

    3) 2-D Drawings and extractions of views.

    4) Digital Drawing Standard.

    5) Create fully documented IGES test cases complying
       with the IGES committees, "The Guide to Developing
       IGES Test Cases", Version 1.0.

b. Test and evaluate CTN test cases, guidelines, recommended
    practices, and policies to ensure compatibility with the
    Marine Design Process.

c. Provide input to ensure reports and findings by LLNL and
    the CTN reflect the best interest of the ship design and
    shipbuilding community.

5.2 SEAWOLF DIGITAL DATA TRANSFER: LESSONS LEARNED

Document the lessons learned implementing data transfer for the SEAWOLF.
This document is crucial for providing information to organizations which
are beginning to implement neutral file database transfers to reduce a
duplication of effort and will be published as a CTN Report with full
credit to the authoring organizations. This report will be written jointly
by Newport News Shipbuilding, Electric Boat Division, and DTRC with input
from NAVSEA PMS350. The purpose is to educate the CALS community to the
efforts and lessons learned in two areas; exchanging drawing using IGES and
creating and implementing IGES for the exchange of 3-D design data for
piping, structure, and HVAC. Although the efforts of the SEAWOLF Digital
Data Transfer Program has been documented in many technical journals, there
still seems to be a lack of specific knowledge of these efforts in the data
exchange community.

a. Develop and publish a case study describing the lessons
    learned transferring SEAWOLF digital data. This report
    will provide detail information in the following areas:

    o   Why IGES was chosen as the neutral file.
    o   CAD vendor interaction.
    o   IGES implementation.
    o   Site specific procedures.
    o   Working Group 'C'.
    o   Working Group 'D'.
    o   IGES Enhancements.
    o   Resolution of Translation Discrepancies.
    o   Lessons learned.
    o   Future directions in data transfer.
    o   Implementation of project unique procedures.
    o   Guidelines for implementing IGES transfers for a
        specific project
    o   Translation Discrepancy Report Database.
    o   Problem Matrix Database.

b. Develop a recommended practices guide to aid in the
    efficient transfer of drawings and models between
    dissimilar CAD systems used for marine design and naval
    architecture applications. Emphasis will be placed on
    reducing the amount of effort required to 'clean up' the
    CAD database after data transfer. These recommended
    practices will then be forwarded to the applicable
    standards for the committee for consideration.

5.3 DEVELOP MARINE INDUSTRY TEST CASES

Develop, locate, and provide data transfer test cases of specific interest
to the NAVY and commercial shipbuilding industry.

a. Provide the CTN with fully documented and validated IGES
    test cases developed for the SEAWOLF digital data
    transfer program; to be included in the CTN test case
    library.

b. Provide the CTN with documented and validated naturally
    occurring IGES test cases which encompass examples from
    marine design and naval architecture to be included in
    the CTN test case library.

c. Distribute and monitor the naturally occurring transfers
    for marine applications.

6. CRITERIA

CTN Test Platforms:

 a. IGES

   LOCATION: Lawrence Livermore National Laboratory
   CONTACT: Jill Farrell
   TELEPHONE: (415) 423-6348
   ELECTRONIC MAIL: farrell@ati.tis.llnl.gov

   1. microVAX running microVMS 4.7 with 8 Mbyte memory,
       150 Mbyte hard disk,
       Pertek 9-track tape drive (800, 1600, 3200, 6250 bpi),
       TK-50 cartridge drive,
       Tektronix 4207 graphics terminal,

       VAX "C" compiler and run-time library,
       IDA parser/verify, IGES view,
       IGES-QC, IMCOS

   2. COMPAQ 386 16 MHz with 80387 Math co-processor,
       2 Mbyte memory,
       40 Mbyte hard disk,

       360 Kb floppy drive,
       KURTA Digitizer, NEC printer,
       Wyse 700 mono 15" monitor.

       AUTOCAD, CADKEY.

   3. Houston Instruments DMP-62 plotter.
       Accessible from both microVAX and from Compaq 386

 b. Raster:

   LOCATION: West Coast Information Systems
   CONTACT: Eric von Dollen
   Telephone: 415/930-7700
   Electronic mail: vdollen@ati.tis.llnl.gov

   EQUIPMENT: 1 3/280 Sun Microsystems, Inc. Data Server
               with 16 Megabyte RAM
               900 Megabyte SMD Disk Drive
               6250/1600 BPI Tape Drive
               2 3/60 Sun Microsystems, Inc. Diskless
                  workstations with 4 Megabytes RAM
               2 TeleVideo Alphanumeric Terminals
               1 Performance Technologies SCSI Board
               1 LMSI 12" Optical Disk Drive
               1 Multitech Systems Modem
   SOFTWARE: Sun Microsystems, Inc.

               UNIX Operating System Version 4.2 Release 3.5

Graphical Kernal System
Network Extensible Windows

Relational Technologies, Inc.

Ingres

CTN Software

ANSI Labelled Tape Utilities
IBM Labelled Tape Utilities
Optical Disk Utilities
Group 4 Compression and Decompression Library
MIL-STD-1840 Test Software

7. DELIVERABLES

TBS

8. SCHEDULE

TBD

CTN TEST PLAN NUMBER CTN89-TM-06

MCDONNELL AIRCRAFT F-15E TECHNICAL ORDER

27 January 1989

1. INTRODUCTION AND BACKGROUND

McDonnell Aircraft Company (MCAIR), Xyvision, Inc. and Warner-Robins Air Logistics Center (WR-ALC), GA. will participate with the CTN in the testing of a CALS digital interchange of a technical manual

2. OBJECTIVES

The test objectives are to test and evaluate the effectiveness of CALS standards for technical data interchange and to demonstrate the technical capabilities and operational suitability of those standards. The test will evaluate the entire transmittal process, including document parsing and assembly capability.

3. PARTICIPANTS

    a. McDonnell Aircraft Company,
       Mr. Robert C. Jackson, 314/872-6044
       St. Louis, MO.

    b. Xyvision, Inc.,
       Moira A. Meehan, 617/245-4100
       Wakefield, MA.

    c. CALS CTN:

       Lawrence Livermore National Laboratory,
       Mr. Peter Prassinos, AITI/CTN Project Manager
       415/422-4758
       Livermore, CA.

       HQ Air Force Logistics Command
       HQ AFLC LMSC/SJTC,
       Ms. Jo Smith, Chief, AFLC CALS Division
       513/257-3085
       WPAFB, OH.

       Syscon Corporation,
       Mr. Al Howe, 619/296-0085
       San Diego, CA.

    d. WR-ALC/MME,
       Ms. Shirley Roland, 912/926-5075
       Robins AFB, GA.

4. STANDARDS & SPECIFICATIONS

The test files used in this test will contain text and graphics in-accordance-with (iaw) the following CALS standards and specifications:

   a. MIL-STD-1840A AITI

   b. MIL-D-28000 IGES

   c. MIL-M-28001 SGML

   d. MIL-D-28002 Raster

   e. MIL-D-28003 CGM

5. PROCEDURES

Technical Order (T.O.) 1F-15E-2-32GS-00-1 will be used as a test case to digitally exchange a technical manual data in accordance with MIL-STD-1840A. The technical order selected for this test is a General System manual for the Landing Gear System, USAF Series F-15E Aircraft. The test case document contains 54 pages of text and 73 supporting illustrations (23 schematics, 49 ortho graphics and 1 fold-out) in addition to the title page and other front matter.

The test will be accomplished in two parts.

Part one includes a technical manual output in digital form from McDonnell Douglas's Xyvision system in compliance with MIL-M-28001 Standard Generalized Mark-up Language (SGML) and Document Type Definition (DTD), a CALS standard defining the format of technical manuals governed by the existing MIL-STD-38784B specification.

Vector graphics will be integrated with composed text upon output in accordance with the CALS MIL-M-28000 Initial Graphics Exchange Standard (IGES) and MIL-D-28003 Computer Graphics Metafile (CGM) standards for illustrations.

This document will be submitted by tape for testing to WR-ALC, to Xyvision, and to the CALS Test Network. A hard-copy version of the technical order will be included.

In part two of the test program, Xyvision will import the tape into its own system, translating the text into a different MIL-M-38784B document tag set and style. The document will be output to a tape in digital form, the text iaw MIL-M-28001 and the vector illustrations iaw MIL-D-28002 Raster.

This tape and the accompanying printed document will then be delivered for testing to WR-ALC and to Syscon where they will be compared with the documentation submitted by MCAIR.

6. CRITERIA

   a. Source (Creation) Systems:

      MCAIR:
        Text -
              Xyvision hardware with IPS 2.1 release.
              MCAIR developed MIL-M-38784B tags and style.
        Vector Illustrations -
              MCAIR's CAD/CATI system, to be output
              in both CAM 8 DCRS fonts.

      XYVISION, Inc:
        Text -
              Xyvision hardware with IPS 2.2 release.
              Xyvision CALS MIL-M-38784B tags and style.
        Illustrations -
              Raster CCITT Group 4.

   b. Receiving (User) System:

      Warner-Robins Air Logistics Center:
        Text -
              Datalogics SGML System.
        Illustration -
              Autotrol - (IGES)

   c. CTN Test Platforms:

    (i). Technical Publications Test Platform

        LOCATION: SYSCON Corporation, San Diego CA
        CONTACT: Al Howe
        TELEPHONE: (619) 296-0085
        ELECTRONIC MAIL: howe@ati.tis.llnl.gov

        Hardware: 1. VAX 11/785, running VMS 4.7 with 8 Mbyte memory,
                   1.2 Gbytes magnetic storage,
                   268 Gbytes optical storage,
                   120 ips magnetic tape (1600, 6250 bpi),
                   line printer and laser printer;
                   ethernet, GPIB and RS-232 interfaces.

                   2. Apollo DN 4000 hosting Auto-trol S-5000 CAD system

                   3. Apollo DN 460 hosting ANAtech software and VANA
                   raster to vector converter fed by Autokon 8200
                   scanner.

                   Apollo systems run Aegis version 9.

                   4. GPIB interconnect from VAX to Apollo DN 4000

                   5. Domain network to Apollo DN 460

Software: 1. Numerous CTN related test tools available on
               appropriate platforms.

(ii). IGES Test Platform

   LOCATION: Lawrence Livermore National Laboratory
   CONTACT: Jill Farrell
   TELEPHONE: (415) 423-6348
   ELECTRONIC MAIL: farrell@ati.tis.llnl.gov

   1. microVAX running microVMS 4.7 with 8 Mbyte memory,
       150 Mbyte hard disk,
       Pertek 9-track tape drive (800, 1600, 3200, 6250 bpi),
       TK-50 cartridge drive,
       Tektronix 4207 graphics terminal,

       VAX "C" compiler and run-time library,
       IDA parser/verify, IGES view,
       IGES-QC, IMCOS

   2. COMPAQ 386 16 MHz with 80387 Math co-processor,
       2 Mbyte memory,
       40 Mbyte hard disk,
       360 Kb floppy drive,
       KURTA Digitizer, NEC printer,
       Wyse 700 mono 15" monitor.

       AUTOCAD, CADKEY.

   3. Houston Instruments DMP-62 plotter.
       Accessible from both microVAX and from Compaq 386

(iii). Raster Test Platform

   LOCATION: West Coast Information Systems
   CONTACT: Eric von Dollen
   Telephone: 415/930-7700
   Electronic mail: vdollen@ati.tis.llnl.gov

   EQUIPMENT: 1 3/280 Sun Microsystems, Inc. Data Server
               with 16 Megabyte RAM
               900 Megabyte SMD Disk Drive
               6250/1600 BPI Tape Drive

               2 3/60 Sun Microsystems, Inc. Diskless Workstations
               with 4 Megabytes RAM

               2 TeleVideo Alphanumeric Terminals

               1 Performance Technologies SCSI Board

               1 LMSI 12" Optical Disk Drive

               1 Multitech Systems Modem

```
SOFTWARE:  Sun Microsystems, Inc.

           UNIX Operating System Version 4.2 Release 3.5
           Graphical Kernal System
           Network Extensible Windows

           Relational Technologies, Inc.

           Ingres

           CTN Software

           ANSI Labelled Tape Utilities
           IBM Labelled Tape Utilities
           Optical Disk Utilities
           Group 4 Compression and Decompression Library
           MIL-STD-1840 Test Software
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7. DELIVERABLES

A "Quick Look" test report will be delivered within 30 days after completion of the test. This report will be prepared by the CTN.

A full test report will be delivered within 60 days after completion of the test. This report will be prepared by the CTN, reviewed and approved by all participants, and delivered for publication and distribution.

8. SCHEDULE

a. MCAIR submit test tape to Xyvision
   December 1988

b. Xyvision submit test tape to CTN
   January 1989

c. Quick Look test report
   March 1989

d. Full test report
   April 1989

e. Test tapes tested on WR-ALC ATOS
   TBD (Est 4rd quarter CY89)

CTN DRAFT TEST PLAN CTN89-TM-09

COMPARISON OF SPECIFICATIONS FOR DIGITAL DELIVERY

9 February 1989

1. INTRODUCTION AND BACKGROUND

MIL-STD-1840A and MIL-M-28001 establish the layout and delivery requirements of DOD CALS Technical Manuals. MIL-M-28001 includes a Document Type Definition (DTD) for MIL-M-38784B, a style and format specification. There are many existing DOD technical manuals which have been assembled in-accordance-with (iaw) other specifications; one notable example is the U.S.Navy technical manuals which are in Work Package format in accordance with MIL-M-81927A; similarly there are many maintenance personnel who have learned their maintenance philosophy from that concept.

2. OBJECTIVE

The objective is to document the effort and cost factors associated with preparation of technical manuals in digital form per MIL-M-28001, using two existing format specifications, and to provide suggestions for improving the efficiency of either or both. A comparison will be made between MIL-M-28001 in it's current form (MIL-M-38784B format and the Navy Blue Book) and a version of MIL-M-28001 adapted for the work package format of MIL-M-81927A. A common maintenance manual will be generated in the style and format of each specification, consistent with the Navy's Master Library Index to the extent feasible, and benchmarks will be be taken.

3. PARTICIPANTS

a. Grumman Aerospace Corporation,
   Mr. Mike McCormack, 516/575-6159
   Bethpage, NY.

b. Grumman Data Systems,
   Mr. Lawrence Beck, 516/682-8478
   Woodbury, NY.

c. CALS CTN:
   Lawrence Livermore National Laboratory,
   Mr. Peter Prassinos, AITI/CTN Project Manager
   415/422-4758
   Livermore, CA.

   HQ Air Force Logistics Command
   HQ AFLC LMSC/SJTC,
   Ms. Jo Smith, Chief, AFLC CALS Division
   513/257-3085, WPAFB, OH.

   Syscon Corporation,
   Mr. Al Howe, 619/296-0085
   San Diego, CA.

4. STANDARDS AND SPECIFICATIONS

The test files used in this test will contain text tagged and formatted iaw the following CALS standards and specifications:

 a. MIL-STD-1840A AITI

 b. MIL-M-28001 SGML

5. PROCEDURES

An analysis of similarities and differences between MIL-M-38784B and MIL-M-81927A will be made and a DTD for a Work Package manual will be prepared, if none exists. The test vehicle will be an existing intermediate maintenance manual for the F-14D aircraft although the results will be applicable to all weapon systems. In fulfilling the objective, digital test files of both versions of the manual, each tagged in accordance with it's respective DTD, will be provided to the CTN for evaluation with reports documenting the efficiencies and cost factors associated with authoring, processing, retrieval and delivery techniques.

6. CRITERIA

 a. Grumman system specifications - TBS

 b. CTN Technical Publications Test Platform:

        LOCATION: SYSCON Corporation, San Diego CA
        CONTACT: Al Howe
        TELEPHONE: (619) 296-0085
        ELECTRONIC MAIL: howe@ati.tis.llnl.gov

        Hardware: 1. VAX 11/785, running VMS 4.7 with 8 Mbyte memory,
                       1.2 Gbytes magnetic storage,
                       268 Gbytes optical storage,
                       120 ips magnetic tape (1600, 6250 bpi),
                       line printer and laser printer;
                       ethernet, GPIB and RS-232 interfaces.

                   2. Apollo DN 4000 hosting Auto-trol S-5000 CAD system

                   3. Apollo DN 460 hosting ANAtech software and VANA
                       raster to vector converter fed by Autokon 8200
                       scanner.

                   Apollo systems run Aegis version 9.

                   4. GPIB interconnect from VAX to Apollo DN 4000

                   5. Domain network to Apollo DN 460

        Software: 1. Numerous CTN related test tools available on
                       appropriate platforms.

7. DELIVERABLES

   a. Recommended changes to MIL-M-28001, the Navy "Blue Book", and the Navy's Master Index.

   b. A sample F-14D manual tagged and indexed per above.

   c. A "Quick Look" test report will be delivered within 30 days after completion of the test. A full test report will be delivered within 60 days after completion of the test; this report will be prepared by the CTN, reviewed and approved by all participants, and delivered for publication and distribution.

8. SCHEDULE

TBS

CTN DRAFT TEST PLAN NUMBER CTN89-TM-10

PRATT & WHITNEY ENGINE TECHNICAL ORDER

6 February 1989

1. INTRODUCTION AND BACKGROUND

Pratt & Whitney (P&W), West Palm Beach, FL, and Northrop Corp, Hawthorne, CA, will participate with the CALS Test Network (CTN) in the testing of a digital interchange of technical manuals utilizing MIL-STD-1840A.

2. OBJECTIVE

The test objective is to evaluate the effectiveness of CALS standards for technical data interchange and to demonstrate the technical capabilities and operational suitability of those standards.

3. PARTICIPANTS

   a. Pratt & Whitney Engine Group,
      Mr. Don Koski, 407/796-2208
      West Palm Beach, FL.

   b. AFPRO Det 4 Pratt & Whitney,
      Mr. Carl Giudici, 407/796-5589
      West Palm Beach, FL.

   c. Northrop Corporation,
      Ms. Karen Marshall, 213/332-6519
      Hawthorne, CA.

   d. CALS CTN:

      Lawrence Livermore National Laboratory,
      Mr. Peter Prassinos, AITI/CTN Project Manager
      415/422-4758
      Livermore, CA.

      HQ Air Force Logistics Command
      HQ AFLC LMSC/SJTC,
      Ms. Jo Smith, Chief, AFLC CALS Division
      513/257-3085
      WPAFB, OH.

      Syscon Corporation,
      Mr. Al Howe, 619/296-0085
      San Diego, CA.

4. STANDARDS AND SPECIFICATIONS
   a. MIL-STD-1840A AITI

   b. MIL-D-28000 IGES

   c. MIL-M-28001 SGML

5. PROCEDURES

5.1 Structured Testing

Structured testing will utilize reference data in the transfers between the P&W facility and the CTN platform. These transfers will be fully analyzed to ascertain the capabilities of the appropriate MIL-STD-1840A data format.

5.1.1. P&W will prepare the SGML (MIL-M-28001) technical publication testing as follows:

   a. Prepare technical publication using CTN reference data.

   b. Prepare MIL-STD-1840A standard tape with SGML text.

   c. Transmit tape and a hard copy of the initial data to the CTN.

5.1.2. P&W will conduct Auto-trol IGES processor verification and end-to-end testing of MIL-D-28000 Class I Technical Illustrations using CTN reference data as follows:

   a. Prepare CAD drawings of the "x-entity" and "sample illustration" using CTN scripts (sets of instructions).

   b. Prepare and deliver hard copy plots of the drawings to the CTN.

   c. Pre-process all CAD drawings into IGES files.

   d. Copy the IGES files to MIL-STD-1840A tape with MIL-STD-1840A standard formats and transmit to the CTN.

5.1.3. P&W will conduct IGES end-to-end testing using P&W reference data in-accordance-with MIL-D-28000, Class I technical illustrations as follows:

   a. Prepare a desired number (approximately 1 to 4) of reference level company drawings. Reference level means:

      i) developing a script of how the drawing(s) was generated on the CAD system.

     ii) pre-processing the drawing(s) into an IGES file.

    iii) editing the pre-processed IGES file(s) so it conforms to IGES Version 2.0 (or subsequent versions), includes all IGES entities required, and does not contain undesirable volunteer entities the CAD processor may erroneously insert.

iv) developing a set of questions to ask of the drawing(s)
after post-processing of the IGES file that reflects
the amount of data transfer P&W finds useful in an
end-to-end exchange.

b. Prepare and deliver hard copy plots of the drawings to the CTN.

c. Pre-process the reference level drawing(s) to an IGES format.

e. Transmit the IGES file(s) on a MIL-STD-1840A standard tape
with a MIL-STD-1840A standard format to the CTN.

5.2 Naturally Occurring Transfer

Naturally occurring experiments are intended to test the normal data
transfer between industry/government facilities using MIL-STD-1840A digital
data formats.

5.2.1. P&W will conduct the natural occurring experiments as follows:

a. Prepare technical publication data as desired to conform
to the MIL-STD-1840A standard.

b. deliver hard copies of text and illustrations to the CTN.

c. Process both the SGML text and the IGES files onto one tape.

d. Transmit one tape to the CTN and one to the pre-arranged
destination (Northrop) for processing.

6. CRITERIA

a. P&W System Specifications:

   Text/SGML - Wang VS 300, O/S 7.1400
               Manually tagged SGML data

   Graphics - Apollo platform running Auto-trol,
              using IGES Version 2.0 (or
              subsequent versions)

b. CTN Technical Publications Test Platform:

   LOCATION: SYSCON Corporation, San Diego CA
   CONTACT: Al Howe
   TELEPHONE: (619) 296-0085
   ELECTRONIC MAIL: howe@ati.tis.llnl.gov

   Hardware: 1. VAX 11/785, running VMS 4.7 with 8 Mbyte memory,
              1.2 Gbytes magnetic storage,
              268 Gbytes optical storage,
              120 ips magnetic tape (1600, 6250 bpi),
              line printer and laser printer;
              ethernet, GPIB and RS-232 interfaces.

2. Apollo DN 4000 hosting Auto-trol S-5000 CAD system

3. Apollo DN 460 hosting ANAtech software and VANA raster to vector converter fed by Autokon 8200 scanner.

Apollo systems run Aegis version 9.

4. GPIB interconnect from VAX to Apollo DN 4000

5. Domain network to Apollo DN 460

Software: 1. Numerous CTN related test tools available on appropriate platforms.

7. DELIVERABLES

A "Quick Look" test report will be delivered with 30 days after completion of the test. This report will be prepared by the CTN.

A full test report will be delivered within 60 days after completion of the test. This report will be prepared by the CTN, reviewed and approved by all participants, and delivered for publication and distribution.

8. SCHEDULE

a. P&W will deliver the structured test tapes two
   months after receipt of order.

b. The naturally occurring test tapes will be delivered at
   at time to be determined based upon availability of
   data and the receiving system(s).

CTN TEST PLAN NUMBER CTN89-TM-ED-11

GEORGIA INSTITUTE OF TECHNOLOGY CALS RESEARCH CENTER

27 January 1989

1. INTRODUCTION AND BACKGROUND

1.1. With the development of the CALS Phase I Core Requirements standards and the initiation of CALS Phase II, it is timely to begin the involvement of universities in both research and educational tasks involving the application of CALS technology to DOD problems.

1.2. A CALS Research Center (CRC) will be established at the Georgia Institute of Technology. This center will be organized within the College of Engineering and will involve the cooperative research of a multidisciplinary team of faculty and students. The program will also include significant cooperative activities with other lead engineering universities.

2. OBJECTIVE

2.1. The principal objective of the CRC is to conduct appropriate research and develop a coherent educational program that is relevant to the CALS Program. Specific objectives include:

a. Establishment of a testbed to demonstrate and evaluate CALS technology in the engineering design process.

b. Development and evaluation of engineering curricular materials that use CALS technology.

c. Transfer of CALS technology and educational materials into other university engineering and design courses.

2.2. In order to achieve these goals, Georgia Tech will establish a close working relationship with representative aerospace companies, Air Logistics Centers, and other universities. These include at the outset the Lockheed Aeronautical Systems Company - Georgia Division (LASC/G) and the Warner Robins Air Logistics Center (WR-ALC), both conveniently located nearby to Georgia Tech and all three already enjoying close and on-going working relationships. The university involvement outside Georgia Tech will be carefully developed over the first several years. Initial discussions have already been initiated with several groups (UPCAEDM - University Programs on Computer-Aided Engineering, Design and Manufacturing, and RAMCAD/VPI&SU) The program will be built on already established university relations wherever possible.

2.3. Specific features of the CRC program include:

a. Collaboration with LASC/G and WR-ALC to maximize the understanding of applied CALS technology and relevance current problems.

b. Establishment of a focused CALS testbed that extends well beyond mere testing of proposed or accepted standards and processes.

c. Development and/or modification of CALS-related graduate courses in engineering.

d. Enhancement of advanced design courses with CALS life-cycle technology.

e. Establishment of workshops on CALS technologies.

3. PARTICIPANTS

a. Georgia Institute of Technology,
   The George W. Woodruff School of
   Mechanical Engineering,
   Dr. Robert E. Fulton, 404/894-7409
   Atlanta, GA.

b. Warner-Robins Air Logistics Center,
   Mr. Palmer Craig, WR-ALC/MMECS, 912/926-3236
   Mr. Scott Howell, WR-ALC/XPS, 912/926-3553
   Robins AFB, GA.

c. Lockheed Aeronautical Systems Company,
   Georgia Division (LASC/G)
   Mr. Charles Lyles, 404/494-5284
   Marietta, GA.

d. CALS CTN:

   Lawrence Livermore National Laboratory,
   Mr. Peter Prassinos, AITI/CTN Project Manager
   415/422-4758
   Livermore, CA.

   HQ Air Force Logistics Command
   HQ AFLC LMSC/SJTC,
   Ms. Jo Smith, Chief, AFLC CALS Division
   513/257-3085
   WPAFB, OH.

4. STANDARDS AND SPECIFICATIONS

a. MIL-STD-1840A AITI

b. MIL-D-28000 IGES

c. MIL-M-28001 SGML

5. PROCEDURES

5.1. Specific Tasks.

The objectives stated above will be accomplished through a series of specific tasks that are outline below and as specified in WR-ALC contract Purchase Request PR #FD2060-88-68248, ID #WR-MME-J&A -89-0701 which is an attachment to this test plan. The first phase of the effort will be to establish a comprehensive technical plan that describes these tasks in detail.

5.1.1. Task 1 - Establish a CALS Testbed.
A testbed consisting of appropriate computer systems, application, and development software, network facilities and operational support will be established in the CAE/CAD Laboratory at Georgia Tech. In addition, establishment of a min-network with LASC/G and WR-ALC will be explored and proposed for implementation if feasible and appropriate.

5.1.2. Task 2 - Test and Evaluate CALS Technology.
Selected CALS test problems will be developed and tested in the Testbed. The development will be carried out in collaboration with LASC/G and WR-ALC and will make maximum use of current and planned CALS activities at both locations. The tests will be designed to allow detailed evaluation of CALS standards for data exchange and CALS technology for process integration. The program will closely complement the more widespread CALS Distributed Testbed program underway at LLNL by focusing on a smaller class of problems and carrying out detailed and thorough evaluations of the tests. The focus will be largely on IGES-related standards and subsequently on PDES-related standards. The results are expected to provide not only greater insight into the problems encountered but also critical information about the range of possible solutions to these problems. Discussions and coordination meetings have already been held with LASC/G and WR-ALC to identify testbed problems and to enlist commitments to support the program. Three different problems have already been identified:

a. An automated tech order project that is coupled with a current LASC/G contract to develop and deliver a C-130 Organizational Maintenance Manuals Set (OMMS) to the WR-ALC ATOS facility. The proposed Georgia Tech test program would involve detailed evaluation of the impact and effectiveness of CALS standards (MIL-STD-1840A, MIL-D-28000) on the accurate transfer of this information from LASC/G to WR-ALC.

b. A project coupled with a proposed LASC/G program to develop and deliver C-141 digitized drawings as part of the C-141 Force Management Plan. The proposed Georgia Tech test program would involve evaluation of IGES/MIL-D-28000 for the exchange of digitized drawings.

c. A project coupled with the ATESSE (Automated Test Equipment Software Support Equipment) program between WR-ALC and the Georgia Tech Research Institute (GTRI - a contract research division of Georgia Tech). This would involve studying

and evaluating the transfer of IGES-based electronic circuit design and fabrication information among several computer-aided design and manufacturing systems at WR-ALC.

After careful evaluation of each problem area, one of the above or a suitable alternative will be selected for study during the first year of the program.

5.1.3. Task 3 - Plan and Develop CALS-related Engineering Curriculum. Curriculum plans in Mechanical Engineering and in Aerospace Engineering will be evaluated and modifications recommend as needed to ensure that CALS technology is properly incorporated in design and manufacturing programs. This will be focused through the college-wide CIMS Program which is a national acclaimed multidisciplinary graduate education and research program sponsored by Georgia Tech and 12 industrial companies. One or more engineering courses will be developed and/or enhanced to incorporate CALS technology. Various means will be considered for incorporating CALS issues in the ABET (Accreditation Board for Engineering and Technology) evaluation criteria that form the basis for the accreditation of all US engineering programs.

5.1.4. Task 4 - Develop University Network. A network of universities will be established to facilitate technology transfer of CALS concepts within the academic community. Georgia Tech will serve as the principal liaison and will direct the initial activities through the UPCAEDM and RAMCAD communities.

5.1.5. Task 5 - Prepare Reports. Regular reports will be prepared summarizing plans and accomplishments. A technical plan will be prepared at the outset and updated annually. Annual reports summarizing program accomplishments will be prepared. Test reports documenting the findings and recommendations from various testbed activities will be prepared in a timely and appropriate manner together with journal and professional society papers.

5.2. CRC Products.

5.2.1. The principal products from the CRC activities are the following:

 a. CALS testbed to evaluate, demonstrate and showcase Cals concepts.

 b. Evaluation of CALS standards including a classification of problems and the identification of solution strategies.

 c. Basic curriculum for incorporating CALS into university engineering programs.

 d. Plans for incorporation of CALS curriculum materials in other universities.

5.2.2. First year products are:

 a. Establishment of a control testbed.

b. Evaluation of MIL-STD-1840A and MIL-D-28000 IGES in 2 - 4 test examples developed in cooperation with LASC/G and WR-ALC.

c. Development of course outlines for one or more graduate-level courses.

d. Establishment of a group of interested universities.

5.3. Personnel. The work will be carried out at Georgia Tech utilizing the CAE/CAD Laboratory with appropriate support from LASC/G, WR-ALC and other organizations as needed. The program will be led by Dr. Robert Fulton, Professor of Mechanical Engineering, as Program Director, and Dr. James Craig, Professor of Aerospace Engineering, as Program Co-director. Other faculty and staff such as CAE/CAD Lab professional staff, lab personnel and graduate students will be included as appropriate. Staffing for the first year will include three graduate research assistants (GRAs) and part-time assistance from a professional staff member in the CAE/CAD Lab. GRA staffing is expected to expand during the second year as the program progresses.

6. CRITERIA

a. Georgia Tech CALS Research Center

b. WR-ALC ATOS and EDCARS

c. LASC/G Technical Manual and Engineering Drawing Systems

7. DELIVERABLES

The deliverables shall be as specified in WR-ALC PR #FD2060-88-68248, ID #WR-MME-J&A-89-0701 which is an attachment to this test plan.

8. SCHEDULE

Georgia Tech will prepare a detailed plan showing the resources to be applied to this program and showing the schedule with milestones for each of the required actions.

CTN DRAFT TEST PLAN NUMBER CTN89-ED-12

SANDIA NATIONAL LABORATORY ENGINEERING DRAWINGS IGES INTERCHANGE

2 February 1989

1. INTRODUCTION AND BACKGROUND

The Sandia National Laboratory will be a test node on the CALS Test Network (CTN).

2. OBJECTIVE

The test objective is to evaluate the effectiveness of CALS standards for technical data interchange and to demonstrate the technical capabilities and operational suitability of those standards.

3. PARTICIPANTS

a. Sandia National Laboratory,
   Mr. Randy Harrison, 505/846-5844
   Mr. Don Doak, 505/846-2902
   Albuquerque, NM

b. CALS CTN:

   Lawrence Livermore National Laboratory,
   Mr. Peter Prassinos, AITI/CTN Project Manager
   415/422-4758
   Livermore, CA

   HQ Air Force Logistics Command
   HQ AFLC LMSC/SJTC,
   Ms. Jo Smith, Chief, AFLC CALS Division
   513/257-3085
   WPAFB, OH

4. STANDARDS AND SPECIFICATIONS

a. MIL-STD-1840A AITI

b. MIL-D-28000 IGES

5. PROCEDURES

The work that Sandia National Laboratory will perform with the CTN in connection with MIL-STD-1840A and MIL-D-28000 Class II and the CTN will be conducted in phases.

5.1. Phase 1: Initial Evaluation Activities

Sandia will:

a. Prepare documentation describing IGES testing that has been conducted in the Nuclear Weapons Complex (NWC) on the exchange of engineering drawings for the Department of Energy Data Exchange Format (DOEDEF) Project. Provide a discussion of the test results with respect to the application and use of MIL-STD-1840A and MIL-D-28000 Class II and prepare initial recommendations for refinements to those standards.

b. Plan and execute the end-to-end tests of MIL-STD-1840A and MIL-D-28000 Class II between DOE/NWC and DOD industry participants. Perform analysis and prepare documentation for for the results of the end-to-end tests including evaluation of the completeness and effectiveness of the drawing exchanges. Provide a description of the problems found in the tests and identify the source of each problem. Prepare recommendations for improvements and revisions to MIL-STD-1840A and MIL-D-28000 Class II standards based on the results of the tests.

c. Prepare status reports on the progress of work to develop a formal model of the information requirements for engineering drawings and provide periodic reports on the drafting model and make any recommendations that can be made for MIL-STD-1840A and MIL-D-28000 Class II based on the model.

5.1.2. Phase 1 Milestones.

5.1.2.1. Phase 1 Milestone 1 will be the completion of the preparation of documentation describing NWC performed end-to-end testing.

For Phase 1 Milestone 1 Sandia will:

a. Prepare a package of documentation that describes the NWC/DOEDEF end-to-end test approach, test cases, and test procedures for engineering drawings.

b. Prepare a summary report of NWC/DOEDEF end-to-end testing results, including an examination of the results with respect to application and use of MIL-STD-1840A and MIL-D-28000 Class II.

c. Prepare initial recommendations for refinements MIL-STD-1840A and MIL-D-28000 Class II.

5.1.2.2. Phase 1 Milestone 2 will be the planning and the CTN Review Board (CTNRB) review for end-to-end tests of MIL-STD-1840A and MIL-D-28000 Class II between DOE/NWC and DOD participating agencies.

For Phase 1 Milestone 2 Sandia will:

a. Perform analysis to determine the appropriate number and type of DOE/NWC and DOD participants for the tests, based on the plans and needs of the CTN.

b. Obtain written commitments for participation from each selected DOE/NWC or DOD agency through the CTN office.

c. Perform analysis to determine the appropriate number and type of test drawings to be used in the end-to-end tests, based on the participating agencies and the needs of the CTN.

d. Prepare a test plan for the end-to-end tests, including a specification of the objectives, approach, deliverables, and schedule for the tests.

e. Submit the test plan for review by the CTNRB.

5.1.2.3. Phase 1 Milestone 3 will be the execution of the planned end-to-end test, including analysis, documentation, and the evaluation of the results and the preparation of recommendations for refinements to MIL-STD-1840A and MIL-D-28000 Class II.

For Phase 1 Milestone 3 Sandia will:

a. Obtain appropriate MIL-D-28000 Class II checking and viewing software for use in the testing; assist the participating agencies in acquiring the software.

b. Provide coordination on preparation of test drawings and MIL-D-28000 Class II data by the participating agencies.

c. Provide coordination on the exchange of test drawings and MIL-D-28000 Class II data between the participating agencies.

d. Provide coordination and assistance on the required analysis and documentation deliverables from the testing participants and prepare a summary report of the end-to-end testing results.

e. Prepare recommendations for improvements and revisions to MIL-STD-1840A and MIL-D-28000 Class II based on the results of the end-to-end tests.

5.1.2.4. Phase 1 Milestone 4 will be the production of the periodic reports on the status of the drafting model, including any recommendations for MIL-STD-1840A and MIL-D-28000 Class II based on the model.

For Phase 1 Milestone 4 Sandia will:

a. Prepare a summary status report after each three-month time interval that describes recent accomplishments and the overall status of work on the drafting model.

b. Provide any recommendations that can be made for MIL-STD-1840A and MIL-D-28000 Class II based on accomplishments in the drafting model work.

5.2 Phase 2: Application Protocol Development.

Sandia will:

a. Analyze the current MIL-STD-1840A digital data transfer procedures and recommend revised transfer procedures if appropriate.

b. Initiate the application protocol approach for some specified portion

of DOD-STD-100. Coordinate the development of a formal model of the information content of an engineering drawing closely with similar work ongoing in the DOE/NWC.

c. Prepare recommendations for improvements and revisions to the MIL-STD-1840A and MIL-D-28000 Class II standards based on the application protocol development work for drawings.

d. Develop a CALS demonstration test bed based on the application protocol approach and designed according to the requirements of CALS and the revised digital data transfer procedures of MIL-STD-1840A for the exchange of engineering drawings in a virtually unbounded environment.

5.3 Phase 3: Application Protocol Implementation.

Sandia will:

a. Extend the application protocol approach from the CALS demonstration test bed to other specified portions of DOD-STD-100 and extend the formal model to include the required parts of DOD-STD-100 for engineering drawings.

b. Prepare recommendations for improvements and revisions to the MIL-STD-1840A and MIL-D-28000 Class II standards based on the application protocol development work for drawings.

c. Coordinate and establish the extended results of the CALS demonstration test bed as CALS production operations. Coordinate the production operations closely with similar activities in the DOE/NWC.

d. Coordinate with the developers of MIL-STD-1840A to implement the revised digital data transfer procedure requirements and to ensure that future enhancements to MIL-STD-1840A are based on the application protocol approach.

6. CRITERIA

TBS

7. DELIVERABLES

Test reports as identified in Paragraph 5, above.

8. SCHEDULE

a. Phase 1 will be accomplished in the first twelve months from contract award.

b. Phase 2 will be accomplished in the twelve months following completion of Phase 1.

c. Phase 3 will be accomplished in the twelve months following completion of Phase 2.

CTN DRAFT TEST PLAN NUMBER CTN89-ED-15

GENERAL ELECTRIC ENGINE ENGINEERING DRAWINGS
OPTICAL DISK INTERCHANGE

6 February 1989

1. INTRODUCTION AND BACKGROUND

General Electric Aircraft Engines (GEAE) will test the delivery of digital
engineering data to the Air Force Logistics Command (AFLC). This raster
data would be accepted by the AFLC Oklahoma City Air Logistics Center's
(OC-ALC) Engineering Data Computer Assisted Retrieval System (EDCARS).
After completion of a feasibility study GEAE decided to modify their
Automated Data Storage and Retrieval System (ADSRS) in order to perform the
test.

2. OBJECTIVE

The objective of the test is to evaluate the delivery of digital
engineering data directly into the AFLC OC-ALC raster repository (EDCARS)
on optical disk and 9-track tape. The CTN will evaluate the effectiveness
of MIL-STD-1840A and monitor the optical disk delivery. The CTN will also
develop prototype acceptance procedures. The results of the tests will be
used to identify the most efficient method of engineering data delivery to
the AFLC engineering data repositories.

3. PARTICIPANTS

 a. General Electric Aircraft Engines (GEAE),
    Mr. Bill Halpin, 513/243-0016
    Cincinnati, OH.

 b. HQ AFLC/MMDB
    Mr. Dave Turner, 513/257-7712
    WPAFB, OH.

 c. Oklahoma City Air Logistics Center,
    OC-ALC/MME,
    Ms. Peggy Hancock
    Tinker AFB, OK.

 d. CALS CTN:
    Lawrence Livermore National Laboratory,
    Mr. Peter Prassinos, AITI/CTN Project Manager
    415/422-4758
    Livermore, CA.

    HQ Air Force Logistics Command
    HQ AFLC LMSC/SJTC,
    Ms. Jo Smith, Chief, AFLC CALS Division
    513/257-3085
    WPAFB, OH.

4. STANDARDS AND SPECIFICATIONS

 a. MIL-STD-1840A AITI

 b. MIL-D-28000 CLASS II IGES

 c. EDCARS Optical Disk Format

5. PROCEDURES

   TBS

6. CRITERIA

 a. GEAE ADSRS

 b. OC-ALC EDCARS Engineering Drawing Repository

7. DELIVERABLES

 a. GEAE produced EDCARS format optical disk and hard copies
    of the engineering drawings.

 b. Quick Look and full test reports 30 and 60 days after
    completion of tests.

8. SCHEDULE

 a. GEAE ADSRS modification installed - April 1989.

 b. Test items delivered by GE to OC-ALC - May 1989.

 c. Test(s) conducted - June 1989.

 d. Quick Look test report - July 1989.

 e. Full test report - August 1989.

CTN DRAFT TEST PLAN CTN89-ED-16

IBM IGES ENGINEERING DRAWINGS

27 January 1989

1. INTRODUCTION AND BACKGROUND

The IBM Corporation will furnish engineering drawings in MIL-STD-1840A format to the CALS Test Network (CTN).

2. OBJECTIVE

The test objective is to evaluate the effectiveness of CALS standards for technical data interchange and to demonstrate the technical capabilities and operational suitability of those standards.

3. PARTICIPANTS

 a. IBM Corporation,
    Mr. James Monaco, 607/751-5734
    Owego, NY.

 b. CALS CTN:

    Lawrence Livermore National Laboratory,
    Mr. Peter Prassinos, AITI/CTN Project Manager
    415/422-4758
    Livermore, CA.

    HQ Air Force Logistics Command
    HQ AFLC LMSC/SJTC,
    Ms. Jo Smith, Chief, AFLC CALS Division
    513/257-3085
    WPAFB, OH.

4. STANDARDS AND SPECIFICATIONS

The test files used in this test will contain engineering drawings in-accordance-with (iaw) the following CALS standards and specification:

 a. MIL-STD-1840A AITI;

 b. MIL-D-28000 Class II IGES

5. PROCEDURES

The IBM Corporation will deliver to the CTN test tapes containing C-size engineering drawings in MIL-STD-1840A format. Hard copy prints of the engineering drawings will also be delivered to the CTN.

6. CRITERIA

a. IBM system specifications - TBS.

b. CTN IGES Test Platform:

   LOCATION: Lawrence Livermore National Laboratory
   CONTACT: Jill Farrell
   TELEPHONE: (415) 423-6348
   ELECTRONIC MAIL: farrell@ati.tis.llnl.gov

   1. microVAX running microVMS 4.7 with 8 Mbyte memory,
       150 Mbyte hard disk,
       Pertek 9-track tape drive (800, 1600, 3200, 6250 bpi),
       TK-50 cartridge drive,
       Tektronix 4207 graphics terminal,

       VAX "C" compiler and run-time library,
       IDA parser/verify, IGES view,
       IGES-QC, IMCOS

   2. COMPAQ 386 16 MHz with 80387 Math co-processor,
       2 Mbyte memory,
       40 Mbyte hard disk,
       360 Kb floppy drive,
       KURTA Digitizer, NEC printer,
       Wyse 700 mono 15" monitor.

       AUTOCAD, CADKEY.

   3. Houston Instruments DMP-62 plotter.
       Accessible from both microVAX and from Compaq 386

7. DELIVERABLES

A "Quick Look" test report will be delivered within 30 days after completion of the test followed by a full test report 60 days after completion of test.

8. SCHEDULE

IBM will deliver the test tapes to the CTN in February 1989.

CTN DRAFT TEST PLAN NUMBER CTN89-TM-17

AIR FORCE DTD DEVELOPMENT

8 February 1989

1. INTRODUCTION AND BACKGROUND

1.1. Presently, most Air Force Technical Orders (TOs) are created, inventoried and distributed as paper documents. Although many of these documents are created and maintained by contractor systems in digital form, they are delivered to the Air Force as paper copies since the current Air Force Technical Order (ATOS) system is not used to accept digital delivery. The Air Force has recognized that this paper oriented system is inefficient in meeting growing requirements for supportable weapons systems and has identified an automation plan for TOs. A key part of this plan is to design and develop links to individual TO data elements under the control of a data base manager. Potentially, this would allow users to assemble related TO information on the screen interactively as tasks require. Ultimately this approach will support establishment of an Integrated Weapons System Data Base (IWSDB) concept.

1.2. One the Air Force program's goals is to review the current ATOS Technical Manual Document Type Definitions (DTDs), and develop and test new DTDs that are required.

2. OBJECTIVE

The objective of this test is utilize the CALS Test Network (CTN) to evaluate the effectiveness and completeness of the DTDs that are presently employed on the ATOS system and those that will be developed under the ATOS program. The CTN will work closely with the Syscon Corp and Datalogics, who are on contract to review existing DTDs and develop new DTDs for the ATOS program office. This test will utilize complete MIL-STD-1840A and MIL-M-28001 technical manual files and tapes.

3. PARTICIPANTS

  a. Mr. Hal Thacker, 513/257-2566
     ATOS Program Director
     HQ AFLC LMSC/SNTI
     Wright-Patterson AFB, OH

  b. Mr. Mike Collier, 513/257-8175
     AF Tech Data Mgt, Tech Manual Specs/Stds (TMSS)
     HQ AFLC/MMTIB (MMDB)
     Wright-Patterson AFB OH

  c. HQ Air Force Logistics Command
     HQ AFLC LMSC/SJTC
     Ms. Jo Smith, Chief, AFLC CALS Division
     513/257-3085
     WPAFB, OH

d. Lawrence Livermore National Laboratory
   Mr. Peter Prassinos, AITI/CTN Project Manager
   415/422-4758, Livermore, CA

e. Mr. Al Howe, 619/296-0085
   Syscon Corporation
   San Diego, CA

f. Ms. Pam Gennusa, 312/266-4399
   Datalogics, Inc.
   Chicago, IL

g. Mr. Denzel Henderson
   AF Tech Order Mgt Sys (AFTOMS) Program Office
   HQ AFLC LMSC/SNTS
   Wright-Patterson AFB OH

4. STANDARDS AND SPECIFICATIONS

4.1. The test files used in this test will contain technical manuals in accordance with (IAW) the following standards and specifications:

a. MIL-STD-1840A AITI

b. MIL-M-28001 SGML

4.2. If it is determined to be of benefit to the program, graphics in the form of text illustrations may be included in the test files IAW with the following standards and specifications:

a. MIL-D-28000 IGES

b. MIL-R-28002 Raster

c. MIL-D-28003 CGM

5. PROCEDURES

5.1. The DTD development and testing effort sponsored by HQ AFLC/ MMTIB and the ATOS/AFTOMS programs offices are identified in two reports, as required by Contract #F42650-83-C-3408:

a. Document Type Definition Analysis Report (CDRL Q001), and

b. Document Type Definition Test Plan (CDRL Q003).

Document 5.1b., above, identifies the testing that is required to validate each DTD. When each DTD is validated it will be delivered to the Air Force. The CTN will participate in this validation testing by providing technical expertise in the CALS standards and specifications areas, by furnishing test facilities when appropriate, and by coordinating the producing of test files and tapes by industry sources. Utilizing its resources, the CTN may arrange for industry facilities to accept and test MIL-STD-1840A files containing the ATOS DTDs, if appropriate.

5.2. Following is a listing of the DTDs (identified in Document 5.1a. above) that will be developed within the scope of the current contract:

a. MIL-M-38784B - Technical Manuals

b. MIL-M-83495 - Job Guide, Fault Reporting, Fault Isolation, General Vehicle Manual, and General Systems Manual, Wiring Diagram/Schematic Diagram Manuals

5.3. Following is the listing of the existing ATOS DTDs for which an initial document analysis was completed:

a. MIL-M-38784A - Technical Manuals

b. MIL-M-38784B - Technical Manuals

c. MIL-M-38807A - IPB

d. MIL-M-38804A - TCTO

e. MIL-M-5096D - Workcards

f. MIL-M-87929 - Work Package

g. MIL-M-9977 - Checklist

h. MIL-M-7700 - Flight Manual, Flight Crew Checklist, Emergency Procedures

i. MIL-M-38769C - Work Unit code Manuals

j. MIL-L-8031D - LOAP

k. MIL-M-83495 - Organizational Maintenance

6. CRITERIA

a. CTN Technical Publications Test Platform:

LOCATION: SYSCON Corporation, San Diego CA
CONTACT: Al Howe
TELEPHONE: 619/296-0085
ELECTRONIC MAIL: howe@ati.tis.llnl.gov

Hardware: 1. VAX 11/785, running VMS 5.0 with 8 Mbyte memory, 1.2 Gbytes magnetic storage, 268 Gbytes optical storage, 120 ips magnetic tape (1600, 6250 bpi), line printer and laser printer; ethernet, GPIB and RS-232 interfaces.

2. Apollo DN 4000 hosting Auto-trol S-5000 CAD system

3. Apollo DN 460 hosting ANAtech software and VANA raster to vector converter fed by Autokon 8200 scanner. Apollo systems run Aegis version 9.

4. GPIB interconnect from VAX to Apollo DN 4000

5. Domain network to Apollo DN 460

Software: Numerous CTN related test tools are available on appropriate platforms.

b. Specifications of additional test platforms within the CTN (including both government and industry systems serving as originators and users of the test files) will be listed here when they are identified.

7. DELIVERABLES

The delivery of the CTN test files and reports will be identified as the testing program progresses.

8. SCHEDULE

8.1. Following is the delivery schedule of the DTDs provided for within the scope of the current ATOS contract:

a. MIL-M-38784B...................February 1989

b. MIL-M-83495

(1) Job Guide.................March 1989

(2) Fault Reporting..........May 1989

(3) Fault Isolation..........July 1989

(4) General Vehicle Manual....August 1989

(5) General Systems Manual....August 1989

(6) Wiring Diagram/Schematic
Diagram Manual............September 1989

8.2. Detailed testing schedules will be provided as the testing program is further refined, on a DTD-by-DTD basis.

CTN DRAFT TEST PLAN NUMBER CTN89-ED-18

NAVAL SEA COMBAT SYSTEM ENGINEERING STATION
IGES ENGINEERING DRAWINGS

22 February 1989

1. INTRODUCTION AND BACKGROUND

The Naval Sea Combat System Engineering Station will participate in the
CALS Test Network (CTN) testing of the interchange of digital engineering
drawings in MIL-STD-1840A and MIL-D-28000 Class II format.

2. OBJECTIVE

The test objective is to evaluate the effectiveness of CALS standards for
technical data interchange and to demonstrate the technical capabilities
and operational suitability of those standards. This test will demonstrate
the Naval Sea Combat System Engineering Stations's ability to utilize CALS
standards to receive and transmit Naval technical information in a digital
format.

The Naval Sea Combat System Engineering Station (NAVSEACOMSYSENGSTAT) is
planning to accept a series of engineering drawings from Tracor, an
engineering contract service company, created in AutoCAD and processed into
an IGES format. NAVSEACOMSYSENGSTAT is interested in testing the end-to-
end transfer of this IGES data from Tracor to their Anvil CAD system before
formally authorizing the data transfer. The CTN will help
NAVSEACOMSYSENGSTAT conduct this testing, will provide the reference
material, will analyze the results, and will publish a useful report.

3. PARTICIPANTS

 a. Naval Sea Combat System Engineering Station,
    (NAVSEACOMSYSENGSTAT)
    Mr. David Sadler, 804/444-9358
    Norfolk, VA.

 b. CALS CTN:

    Lawrence Livermore National Laboratory,
    Mr. Pete Prassinos, AITI/CTN Project Manager
    415/422-4758
    Livermore, CA.

    HQ Air Force Logistics Command
    HQ AFLC LMSC/STJC,
    Ms. Jo Smith, Chief, AFLC CALS Division
    513/257-3085
    WPAFB, OH.

4. STANDARDS AND SPECIFICATIONS

The test files used in this test will contain engineering drawings in-accordance-with (iaw) the following CALS standards and specifications:

 a. MIL-STD-1840A AITI

 b. MIL-D-28000 Class II IGES

5. PROCEDURES

5.1. Structured Testing.

The following structured testing will utilize reference data in the transfers between the NAVSEACOMSYSENGSTAT (NSCSES), Tracor, and the CTN platform. These transfers will be fully analyzed to ascertain the capabilities of the MIL-D-28000 data format and the IGES processors.

5.1.1. Conduct IGES pre-processor verification of the Tracor AutoCAD CAD system using CTN reference data. Tracor will:

 a. Prepare CAD drawings of the NENTITY and LBRACKT reference
    drawings using CTN generation scripts (sets of instructions).

 b. Prepare and deliver hard copy plots of the drawings to the
    CTN and to the NSCSES.

 c. Pre-process all CAD drawings into IGES files, noting all
    errors the system reports.

 d. Copy the IGES files to two MIL-STD-1840A standard tapes with
    MIL-STD-1840A standard formats and transmit one copy to the
    CTN and another to the NSCSES.

5.1.2. Conduct IGES end-to-end testing with the Tracor data and post-processing verification of the NSCSES's Anvil CAD system using CTN reference data. NSCSES will:

 a. Accept from the CTN and from Tracor the NENTITY and LBRACKT
    reference IGES files with MIL-STD-1840A formats.

 b. Post-process all four IGES files into NSCSES's CAD system,
    noting all errors the system reports.

 c. Follow the evaluation scripts to inspect the post-processed
    models.

 d. Send the completed evaluation scripts and any error reports
    to the CTN.

5.1.3. Conduct IGES pre-processor verification of the NSCSES Anvil CAD system using CTN reference data. NSCSES will:

 a. Prepare CAD drawings of the NENTITY and LBRACKT reference

drawings using CTN generation scripts (sets of instructions).

b. Prepare and deliver hard copy plots of the drawings to the CTN.

c. Pre-process all CAD drawings into IGES files, noting all errors the system reports.

d. Copy the IGES files to a MIL-STD-1840A standard tape with MIL-STD-1840A standard formats and transmit to the CTN.

5.1.4. (OPTIONAL) Conduct IGES testing using NSCSES reference data (MIL-D-28000 Class II). NSCSES will:

a. Prepare a desired number (approximately 1 to 4) of reference level drawings. Reference level means:

   i)   developing a script of how the drawing(s) was generated on the CAD system.

   ii) pre-processing the drawing(s) into an IGES file.

   iii) editing the pre-processed IGES file(s) so it conforms to IGES Version 4.0 and MIL-D-28000 Class II, includes all IGES entities desired, and does not contain undesirable volunteer entities the CAD processor may erroneously insert.

   iv) adding MIL-STD-1840A declaration files and headers to the IGES file(s) and creating a MIL-STD-1840A standard tape.

   v)   developing a set of questions to ask of the drawings(s) after post-processing of the IGES file that reflects the amount of data transfer NSCSES finds useful in an end-to-end exchange.

b. Conduct a pre-processor test at Tracor as outline in paragraph 5.1.1. with this NSCSES reference data.

c. Conduct a post-processor test as outlined in paragraph 5.1.2.

d. Conduct a pre-processor test as outlined in paragraph 5.1.3.

5.2. (OPTIONAL) Prepare other material of interest to the CTN.

These tasks will assist the CTN in understanding the Navy's procedures and requirements in accepting data, thus aiding in the improvement of the CALS standards and the development of production digital acceptance procedures.

a. NSCSES to document any prior IGES testing.

b. NSCSES to document how it normally receives and accepts paper data (acceptance procedures).

c. NSCSES to document how it expects to receive and accept
   digital data on electronic media.

6. CRITERIA

   a. NSCSES system specifications:

      Cluster of DEC VAX's
      Anvil 5000 CAD System, latest revision

   b. Tracor system specifications:

      Personal Computers
      AutoCAD, Revision 9

   c. CTN IGES Test Platform:

      LOCATION: Lawrence Livermore National Laboratory
      CONTACT: Jill Farrell
      TELEPHONE: (415) 423-6348
      ELECTRONIC MAIL: farrell@ati.tis.llnl.gov

      1. microVAX running microVMS 4.7 with 8 Mbyte memory,
         159 Mbyte hard disk,
         Pertek 9-track tape drive (800, 1600, 3200, 6250 bpi),
         Tektronix 4207 graphics terminal,
         VT320 console terminal

         VAX "C" compiler and run-time library,
         IDA parser/verify, IGES view,
         IMTES

      2. COMPAQ 386 16 MHz with 80387 Math co-processor,
         4 Mbyte memory,
         40 Mbyte hard disk,
         360 Kb floppy drive, 1.2 Mb floppy drive,
         KURTA Digitizer, NEC printer,
         Wyse 700 mono 15" monitor.

         AUTOCAD, CADKEY.

      3. Houston Instruments DMP-62 plotter.
         Accessible from both microVAX and from Compaq 386

7. DELIVERABLES

A "Quick Look" test report will be delivered 30 days after completion of
the test followed by a full test report 60 days after completion of the
test.

8. SCHEDULE

Testing is estimated to begin in May 1989.

CTN TEST PLAN CTN89-ED-19

DOUGLAS AIRCRAFT COMPANY

IGES MIL-D-28000 CLASS II REFERENCE DRAWINGS INTERCHANGE

23 February 1989

1. INTRODUCTION AND BACKGROUND

The Douglas Aircraft Company will participate in the CALS Test Network (CTN) testing of the interchange of digital engineering drawings in MIL-STD-1840A and MIL-D-28000 Class II format.

2. OBJECTIVE

The test objective is to evaluate the effectiveness of CALS standards for technical data interchange and to demonstrate the technical capabilities and operational suitability of those standards. This test will demonstrate Douglas Aircraft Company's ability to utilize these standards to transmit the necessary technical information in a digital format. Furthermore, this test will examine the CALS Test Network's MIL-D-28000 reference material including procedures, scripts, and IGES files.

3. PARTICIPANTS

   a. Douglas Aircraft Company
       Mr. Michael Gygi
       Internal Mail Code 77-310
       3855 Lakewood Blvd.
       Long Beach, CA 90846
       714/952-6250

   b. Lawrence Livermore National Laboratory
       Ms. Jill Farrell
       P.O. Box 808 L-542
       Livermore, CA 94550
       415/423-6348

   c. HQ Air Force Logistics Command
       HQ AFLC LMSC/SJTC
       Ms. Jo Smith, Chief, AFLC CALS Division
       513/257-3085
       WPAFB, OH

   d. HQ Aeronautical Systems Division
       C-17 Deputy Program Manager for Logistics
       Col. Tom Mackey
       HQ ASD/YCL
       Wright-Patterson AFB, OH 45433
       513/255-3737

e. HQ Aeronautical Systems Division
        C-17 Logistics
        Capt. David Straka
        HQ ASD/YCLS
        Wright-Patterson AFB, OH 45433
        513/255-3737

4. STANDARDS AND SPECIFICATIONS

The test files used in this test will contain engineering drawing in-accordance-with the following CALS standards and specification:

    a. MIL-STD-1840A AITI

    b. MIL-D-28000 Class II IGES

5. PROCEDURES

The following tasks are intended to fulfill the objectives of this test plan.

5.1. Structured testing.

The following structured testing will utilize reference data in the transfers between Douglas Aircraft Company (DAC) and the CTN platform. These transfers will be fully analyzed to ascertain the capabilities of the MIL-D-28000 data format and the IGES processors.

5.1.1 Conduct IGES pre-processor verification of Douglas Aircraft Company's Unigraphics CAD System using CTN reference data. DAC will:

    a. Prepare CAD drawings of the "NENTITY" and "LBRACKT"
       reference drawings using CTN generation scripts (sets of
       instructions).

    b. Prepare and deliver hard copy plots of the drawings to the
       CTN.

    c. Pre-process all CAD drawings into IGES files, noting all
       errors the system reports.

    d. Copy the IGES files to 1840A standard tape with MIL-STD-1840A
       declaration files, headers records, and standard formats and
       transmit to the CTN.

5.1.2 Conduct IGES post-processing verification of DAC's CAD System using CTN reference data. DAC will:

    a. Accept from the CTN the "NENTITY" and "LBRACKT" reference
       IGES files with MIL-STD-1840A standard declaration files and
       formats.

    b. Post-process both files into DAC's CAD system, noting all
       errors the system reports.

c. Follow the evaluation script to inspect the post-processed model.

d. Send the completed evaluation script and any error reports to the CTN.

6. CRITERIA

a. Douglas Aircraft Company Unigraphics CAD System

b. CTN IGES Test Platform

   LOCATION: Lawrence Livermore National Laboratory
   CONTACT: Jill Farrell
   TELEPHONE: (415) 423-6348
   ELECTRONIC MAIL: farrell@ati.tis.llnl.gov

   1. microVAX running microVMS 4.7 with 8 Mbyte memory,
      150 Mbyte hard disk,
      Pertek 9-track tape drive (800, 1600, 3200, 6250 bpi),
      TK-50 cartridge drive,
      Tektronix 4207 graphics terminal,

      VAX "C" compiler and run-time library,
      IDA parser/verify, IGES view,
      IGES-QC, IMCOS

   2. COMPAQ 386 16 MHz with 80387 Math co-processor,
      2 Mbyte memory,
      40 Mbyte hard disk,
      360 Kb floppy drive,
      KURTA Digitizer, NEC printer,
      Wyse 700 mono 15" monitor.

      AUTOCAD, CADKEY.

   3. Houston Instruments DMP-62 plotter.
      Accessible from both microVAX and from Compaq 386

7. DELIVERABLES

A "Quick Look" test report will be delivered by the CTN 30 days after completion of the test followed by a full test report 60 days after completion of the test.

8. SCHEDULE

Testing began in February 1989.

CTN DRAFT TEST PLAN NUMBER CTN89-TM-ED-21

TEXAS INSTRUMENTS

6 March 1989

1. INTRODUCTION

Texas Instruments (TI) will participate in the Computer-Aided Acquisition
and Logistics Support (CALS) program Test Network (CTN) in the testing of
the CALS standards and specifications for the digital interchange of
technical manuals.

2. OBJECTIVES

The test objectives are to test and evaluate the effectiveness of CALS
standards and specifications for technical data interchange and to
demonstrate the technical capabilities and operational suitability of those
standards. The test will evaluate the entire transmittal process,
including document parsing and assembly capability, both from TI to the CTN
and from the CTN to TI.

3. PARTICIPANTS

 a. Texas Instruments
    Mr. Mike Hurn, 214/575-6065
    Plano, TX.

 b. Lawrence Livermore National Laboratory
    Mr. Peter Prassinos, AITI/CTN Project Manager
    415/422-4758
    Livermore, CA.

 c. HQ Air Force Logistics Command
    HQ AFLC LMSC/SJTC
    Ms. Jo Smith, Chief, AFLC CALS Division
    3/257-3085
    Wright-Patterson Air Force Base, OH.

 d. Syscon Corporation
    Mr. Al Howe, 619/296-0085
    San Diego, CA.

4. STANDARDS & SPECIFICATIONS

The test files used in this test will contain text and graphics in-
accordance-with (iaw) the following CALS standards and specifications:

 a. MIL-STD-1840A AITI;

 b. MIL-D-28000 IGES, Class I and Class II Sub-sets;

 c. MIL-M-28001 SGML;

d. MIL-D-28002 CCITT Group 4 Raster;

e. MIL-D-28003 CGM.

5. PROCEDURES

5.1. The TI to CTN Test Phase. TI will produce and deliver to the CTN three MIL-STD-1840A 9-track test tapes consisting of:

a. Technical manual with SGML tagged text and IGES graphics
   (illustrations);

b. Engineering drawing iaw IGES Class II Sub-set;

c. Technical manual with SGML tagged text and CGM graphics
   (illustrations).

The CTN will evaluate these tapes on the appropriate test platforms and the test results will be provided to TI. If it is deemed necessary by the participants, TI will re-submit corrected tapes.

5.2. The CTN to TI Test Phase. The CTN will provide to TI MIL-STD-1840A 9-track test tapes containing technical manual SGML text, IGES and CGM graphics (text illustrations and engineering drawings). These files will be tested by TI and the results will be evaluated by the participants to determine if further testing in this phase is. required.

5.3. Raster Testing. During the test the participants will identify the exact nature of any raster testing (MIL-D-28002 Type I [Untiled] or Type II [Tiled]) required, based on facilities, hardware, and software (including tools) that are available. This testing will be described in revisions to this test plan.

6. CRITERIA

a. Texas Instruments Systems:

   (1) Authoring Workstation Sun 386i with Interleaf Software

   (2) Technical Publications Workstation with Shaffstall
       Converter and SGML Software

   (4) Technical Publications Graphics Workstation with
       CV IGES/Intercap IGES and CGM Translators

   (5) Drawing Control Engineering Drawing Data Base Workstation

b. CTN Test Platforms

   (1). Technical Publications Test Platform

       LOCATION: SYSCON Corporation, San Diego CA
       CONTACT: Al Howe
       TELEPHONE: (619) 296-0085

ELECTRONIC MAIL: howe@ati.tis.llnl.gov

Hardware: VAX 11/785, running VMS 4.7 with 8 Mbyte memory,
             1.2 Gbytes magnetic storage,
             268 Gbytes optical storage,
             120 ips magnetic tape (1600, 6250 bpi),
             line printer and laser printer;
             ethernet, GPIB and RS-232 interfaces.

             Apollo DN 4000 hosting Auto-trol S-5000 CAD system

             Apollo DN 460 hosting ANAtech software and VANA
             raster to vector converter fed by Autokon 8200
             scanner.

             Apollo systems run Aegis version 9.

             GPIB interconnect from VAX to Apollo DN 4000

             Domain network to Apollo DN 460

Software: Numerous CTN related test tools available on
             appropriate platforms.

(2). IGES Test Platform

   LOCATION: Lawrence Livermore National Laboratory
   CONTACT: Jill Farrell
   TELEPHONE: (415) 423-6348
   ELECTRONIC MAIL: farrell@ati.tis.llnl.gov

      microVAX running microVMS 4.7 with 8 Mbyte memory,
      150 Mbyte hard disk,
      Pertek 9-track tape drive (800, 1600, 3200, 6250 bpi),
      TK-50 cartridge drive,
      Tektronix 4207 graphics terminal,

      VAX "C" compiler and run-time library,
      IDA parser/verify, IGES view,
      IGES-QC, IMCOS

      COMPAQ 386 16 MHz with 80387 Math co-processor,
      2 Mbyte memory,
      40 Mbyte hard disk,
      360 Kb floppy drive,
      KURTA Digitizer, NEC printer,
      Wyse 700 mono 15" monitor.

      AUTOCAD, CADKEY.

      Houston Instruments DMP-62 plotter.
      Accessible from both microVAX and from Compaq 386

(3). Raster Test Platform

    LOCATION: West Coast Information Systems
    CONTACT: Eric von Dollen
    Telephone: 415/930-7700
    Electronic mail: vdollen@ati.tis.llnl.gov

    EQUIPMENT: 3/280 Sun Microsystems, Inc. Data Server
                with 16 Megabyte RAM
                900 Megabyte SMD Disk Drive
                6250/1600 BPI Tape Drive

                3/60 Sun Microsystems, Inc. Diskless Workstations
                with 4 Megabytes RAM

                TeleVideo Alphanumeric Terminals

                Performance Technologies SCSI Board

                LMSI 12" Optical Disk Drive

                Multitech Systems Modem

    SOFTWARE: Sun Microsystems, Inc.

                UNIX Operating System Version 4.2 Release 3.5
                Graphical Kernal System
                Network Extensible Windows

                Relational Technologies, Inc.

                Ingres

                CTN Software

                ANSI Labelled Tape Utilities
                IBM Labelled Tape Utilities
                Optical Disk Utilities
                Group 4 Compression and Decompression Library
                MIL-STD-1840 Test Software

7. DELIVERABLES

a. A "Quick Look" test report will be prepared within 30 days
   after completion of each phase of the test.

b. A "Full" test report will be prepared and delivered within
   60 days after completion of each phase of the test.

c. These test reports will be jointly prepared and approved
   by the participants before release to other CTN members
   or for other distribution.

8. SCHEDULE

   a. The TI to CTN Test Phase Schedule:

     (1). The TI technical manual SGML/IGES test tape will be
         delivered to the CTN in September 1989.

     (2). The TI engineering drawing IGES test tape will be
         delivered to the CTN in October 1989.

     (3). The TI technical manual SGML/CGM test tape will be
         delivered to the CTN in November 1989.

     (4). If necessary, re-submittal tapes will be delivered
         to the CTN not-later-than 2QCY90.

   b. The CTN to TI Phase test tapes submittal schedule will be
      determined as the TI to CTN Test Phase progresses.

CTN DRAFT TEST PLAN NUMBER CTN89-ED-22

OO-ALC CAD DRAWING EXCHANGE

8 March 1989

1. INTRODUCTION

1.1. With the approval of MIL-D-28000 covering the Initial Graphics Exchange Specification (IGES) Version 4.0 neutral graphics file format, there will soon be efforts to upgrade Computer-Aided-Design (CAD) equipment at the Air Force Air Logistics Centers (ALCs) to implement vendor IGES V4.0 software. Such an implementation occurred at the Ogden Air Logistics Center (OO-ALC) in Oct 1988. Since the usability of IGES Version 4.0 will have a major bearing on the ability of DOD to acquire and manage digitized engineering drawings, it is imperative that the implementation of IGES be tested as soon as possible.

1.2. OO-ALC/MMEDOD has done considerable organic work with the previous IGES Versions and thus has compiled local expertise in their use. From this basis, their involvement will be valuable in determining what potential problems exist in the the new IGES Version 4.0 environment.

2. OBJECTIVES

The principal objectives associated with this CTN test include utilizing 2D and 3D IGES Version 4.0 data and evaluating it's compliance to MIL-D-28000, including determining the inconsistencies between the product data and the specification and identifying potential flaws in the IGES V4.0 format that require future action.

3. PARTICIPANTS

  a. HQ Air Force Logistics Command
     Mr. Robert Rosell
     HQ AFLC/MMDB, 513/257-2153
     Wright-Patterson Air Force Base, OH

  b. Ogden Air Logistics Center
     Mr. Richard Thomas
     OO-ALC/MMEDOD, 801/777-7114
     Hill Air Force Base, UT

  c. HQ Air Force Logistics Command
     Ms. Jo Smith, Chief, AFLC CALS Division
     HQ AFLC LMSC/SJTC, 513/257-3085
     Wright-Patterson Air Force Base, OH

  d. Lawrence Livermore National Laboratory
     Mr. Peter Prassinos, AITI/CTN Project Manager
     415/422-4758
     Livermore, CA

4. STANDARDS & SPECIFICATIONS

The tests will be conducted using data in-accordance-with the following CALS standards and specifications:

  a. MIL-STD-1840A AITI;

  b. MIL-D-28000 IGES.

5. PROCEDURES

5.1. OO-ALC/MMEDOD will utilize CAD-created engineering drawing data on an aircraft landing gear repair bushing and create IGES files containing 2D drawing 3D wire frame entity information. These IGES files will be stored on magnetic tape and submitted, along with hardcopy drawing and 3D figure information, to the CTN for testing.

5.2. The CTN will evaluate the IGES file for adherence to the requirements as defined in MIL-STD-1840A and MIL-D-28000, as applicable. The CTN will also compare the CAD-data created from the IGES files against the hardcopy information for transferability.

6. CRITERIA

  a. Source (creation) System:

    Location: OO-ALC/MMEDOD, Hill AFB, UT.

    Hardware: Apollo Systems DN 3000 Workstations
              4 Megabyte RAM
              1600 bpi magnetic tape (1/2 inch) drive

    Software: Auto-trol Technology Corp. Series 7000
              Mechanical Applications

  b. CTN IGES Test Platform

        LOCATION: Lawrence Livermore National Laboratory
        CONTACT: Jill Farrell
        TELEPHONE: (415) 423-6348
        ELECTRONIC MAIL: farrell@ati.tis.llnl.gov

          microVAX running microVMS 4.7 with 8 Mbyte memory,
          150 Mbyte hard disk,
          Pertek 9-track tape drive (800, 1600, 3200, 6250 bpi),
          TK-50 cartridge drive,
          Tektronix 4207 graphics terminal,

          VAX "C" compiler and run-time library,
          IDA parser/verify, IGES view,
          IGES-QC, IMCOS

          COMPAQ 386 16 MHz with 80387 Math co-processor,
          2 Mbyte memory,

40 Mbyte hard disk,
360 Kb floppy drive,
KURTA Digitizer, NEC printer,
Wyse 700 mono 15" monitor.

AUTOCAD, CADKEY.

Houston Instruments DMP-62 plotter.
Accessible from both microVAX and from Compaq 386

7. DELIVERABLES

a. A "Quick Look" test report will be delivered within 30 days after completion of the test. This report will be prepared by the CTN.

b. A "Full" test report will be delivered within 60 days after completion of the test. This test report will be prepared by the CTN, reviewed by all participants, and delivered for publication and distribution.

8. SCHEDULE

a. OO-ALC/MMEDOD will submit IGES tapes to CTN in March 1989.

b. Quick Look test report - June 1989.

c. Full test report - July 1989.